WEST Search History

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DATE: Thursday, April 14, 2005

Hide?	Set Name	Query	Hit Count
		DB=EPAB,JPAB,DWPI; PLUR=YES; OP=ADJ	
■	L58	L57 not (l48 or l47 or l54)	14
■	L57	L56 same (accuracy or credibility or error)	15
■	L56	evaluat$3 near3 map	197
■	L55	(map database) near3 version	1
■	L54	L53 not (l48 or l47)	14
■	L53	collat$3 same l46	14
■	L52	l37 and l38	0
■	L51	l37 same l38	0
■	L50	road near2 location	450
■	L49	vehicle near3 (position or location)	43466
■	L48	l46 same (accuracy or credibility)	17
■	L47	(map database) near3 (error or inaccurate)	2
■	L46	updat$3 near3 map	994
		DB=PGPB; PLUR=YES; OP=ADJ	
■	L45	L44 not (l40 or l41 or l43)	7
■	L44	l36 same (accuracy or credibility)	8
■	L43	(map database) near3 version	5
■	L42	L41 not l40	5
■	L41	collat$3 same l34	5
■	L40	L39 and l36	2
■	L39	L38 same l37	170
■	L38	vehicle near3 (position or location)	15048
■	L37	road near2 location	598
■	L36	evaluat$3 near3 map	402
■	L35	(map database) near3 (error or inaccurate)	7
■	L34	updat$3 near3 map	1763
		DB=USPT; PLUR=YES; OP=ADJ	
■	L33	L32 not (l14 or l8 or l18 or l19 or l21 or l27 or l28 or l31)	29
■	L32	l29 and l4	34
■	L31	L30 not (l14 or l8 or l18 or l19 or l21 or l27 or l28)	15
■	L30	L29 same (accuracy or credibility)	18

■	L29	evaluat$3 near3 map	516
■	L28	(map database) near3 (error or inaccurate)	11
■	L27	collat$3 same l5	4
■	L26	collat$3 same l23	1
■	L25	L24 not (l14 or l8 or l18 or l19 or l21)	22
■	L24	L23 and l5	32
■	L23	L22 same l6	309
■	L22	road near2 location	1198
■	L21	(map database) near3 version	3
■	L20	l4 and l5	256
■	L19	l5 same l16	3
■	L18	L17 not (l14 or l8)	6
■	L17	L16 and l15	10
■	L16	(off road) or (no road)	5344
■	L15	l5 same l6	95
■	L14	L13 not l8	15
■	L13	(map database) near3 (accuracy or credibility)	24
■	L12	l8 not l9	15
■	L11	l9 not l10	31
■	L10	L9 and l4	47
■	L9	L8 and l6	78
■	L8	l5 and l7	93
■	L7	map matching	749
■	L6	vehicle near3 (position or location)	54785
■	L5	updat$3 near3 map	2677
■	L4	l1 or l2 or l3	2989
■	L3	342/357.09,357.13.ccls.	545
■	L2	702/5.ccls.	121
■	L1	701/208,210,207,200.ccls.	2505

END OF SEARCH HISTORY

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the renewal equipment of map information and the system which perform creation of the map information used for navigation equipment etc., and updating.
[0002]
[Description of the Prior Art] The map display function as which the navigation equipment for mount generally displays maps, such as the circumference of a car location, on a screen, The path probe ability which searches for the path to the destination specified by the user or the course ground, The mark which shows the address of the path induction machine ability which guides transit of a car in accordance with the path searched for by path planning, or various facilities is displayed on a map, or it has various kinds of functions, such as a facility advice function to process displaying the information relevant to those facilities etc. Usually, each of these functions are realized by performing predetermined processing based on the map information offered through disk mold media, communication media, etc., such as CD (compact disk) and DVD (digital versatile disc).
[0003]
[Problem(s) to be Solved by the Invention] By the way, the map information mentioned above is suitably updated by the newest content by the specific manufacturer who performs creation and the maintenance of this map information, and the newest route situation is reflected. By the specific manufacturer, in order to do such an updating activity, the content of the map information database which self owns is made into the newest thing, but actually, since renewal of a content of this map information database will be performed at the predetermined spacing, a gap may arise to the newest route situation in just before a certain updating timing. For example, when from a certain updating timing before the following updating timing had abolition and a new addition of a route, or when there is assignment or discharge of a traffic stop route, the content of the map information database and a actual route situation will be selectively different until such information is reflected to the following updating timing. Moreover, even if it shortens updating timing since a limitation is in the examination range or examination precision naturally in investigating a actual route situation based on results, such as exploration, it becomes difficult to grasp a actual route situation certainly.
[0004] Moreover, although the technique of creating map information based on aerial photograph is generally used, since superficial 2-dimensional information is only acquired in aerial photograph and height information is not acquired by accuracy, in case the die length of the route also in consideration of the height direction etc. is determined, an error arises, and there is a possibility that the precision of the map information stored in the map information database may fall. Since especially the data of the time amount (transit cost) which it takes when it runs a route to the map information created by carrying out such actually are not contained, even if it creates CD and DVD in which the newest map information created by doing in this way was made to reflect, exact travel time cannot calculate in navigation equipment, but the approach of creating exact map information also including transit cost is desired.
[0005] This invention is created in view of such a point, and the object is in offering the renewal equipment of map information and the system which can raise the precision of map information.
[0006]
[Means for Solving the Problem] In order to solve the technical problem which mentioned above, the renewal

equipment of this invention of map information is equipped with the map information database with which map information is stored, a locus information receiving means receive the transit locus information sent from a car, and a renewal means of map information update the content of the map information database based on the transit locus information received by the locus information receiving means. Since the content of the map information database can be serially updated based on the transit locus information actually sent from the car under transit, the precision of map information can be raised.

[0007] Moreover, it is desirable to include the location and bearing, and transit time of a car in the transit locus information mentioned above. By using these data, it becomes possible to grasp the exact transit hysteresis which also considered the time element, and it can update map information to accuracy.

[0008] Moreover, a route configuration and transit cost are included in the map information stored in the map information database, and, as for the renewal means of map information mentioned above, it is desirable to update the data of the route configuration stored in the map information database and transit cost based on transit locus information. By the former, creation of the map information on the high degree of accuracy in which the actual transit cost which has not been grasped to accuracy was made to reflect is attained by including the data of transit cost in map information in addition to a route configuration, and updating based on the transit hysteresis information that this is sent from each car.

[0009] Moreover, as for the renewal means of map information mentioned above, it is desirable to judge the closed route and the abolished route based on transit locus information, and to update the content of the map information database. Since the existence of these routes can be judged now on real time, it becomes possible to make the newest route configuration always reflect in map information, and to raise the precision of map information.

[0010] The renewal equipment of map information which mentioned above the renewal system of map information of this invention, and two or more cars are connected through the network. This car is equipped with the navigation equipment which has a locus information creation means generate transit locus information, a transmit-timing judging means judge the transmit timing of the locus information generated by the locus information creation means, and a locus information transmitting means transmit the transit locus information created by the locus information creation means towards the renewal equipment of map information by the transmit timing judged by the transmit-timing judging means. When a car is equipped with such navigation equipment, it becomes possible to send transit locus information to the renewal equipment of map information from the car under transit to predetermined timing, and it can update the content of the map information database serially based on the transit locus information actually sent from the car under transit.

[0011] Moreover, the navigation equipment mentioned above is further equipped with the autonomous navigation sensor which detects the location and bearing of a car using the sensor with which the car was equipped, and, as for a locus information creation means, it is desirable to create transit locus information based on the location and bearing of a car which were detected by the autonomous navigation sensor. Generally, compared with the case where detection results, such as a GPS receiver, are used, little transit locus information on with error can be acquired by creating transit hysteresis information using the detection result of an autonomous navigation sensor.

[0012]

[Embodiment of the Invention] Hereafter, the renewal system of map information of 1 operation gestalt which applied this invention is explained, referring to a drawing. Drawing 1 is drawing showing the renewal structure of a system of map information of 1 operation gestalt. The renewal system of map information shown in drawing 1 is constituted including the navigation equipment 1-1 carried in each car, 1-2, --, 1-n and the map information server 2 as renewal equipment of map information. It connects through the predetermined network 3 between each navigation equipment 1-1, 1-2, --, 1-n and the map information server 2. In addition, the network 3 in this operation gestalt shall be constituted including various kinds of communication networks, such as a common telephone network and mobile radiotelephone network and the Internet. Moreover, it shall connect between navigation equipment 1-1 grade and a network 3 using a mobile radiotelephone (not shown) etc.

[0013] Next, the detail configuration of navigation equipment 1-1 grade is explained. Drawing 2 is drawing

showing the detail configuration of navigation equipment 1-1. In addition, other navigation equipments 1-2, --, 1-n also have the same configuration as navigation equipment 1-1.
[0014] The navigation equipment 1-1 shown in drawing 2 is carried in the car, and is constituted including the navigation controller 10, the DVD reader 11, a control unit 12, GPS receiver 13, the autonomous navigation sensor 14, a display 15, the communications processing section 16, memory 17, and a clock 18.
[0015] The navigation controller 10 controls the actuation by the whole navigation equipment 1-1, such as displaying the map around a car location or performing the path planning and course guidance to the destination specified by the user. This navigation controller 10 has the configuration as a computer containing CPU, ROM, RAM, etc., and performs predetermined control action by performing predetermined software (program) stored in ROM or RAM.
[0016] Moreover, the navigation controller 10 created the predetermined locus information (it mentions later for details) which shows a transit locus with transit of a car, and the processing transmitted to the map information distribution server 2 through a network 3 to predetermined timing has also gone. In order to perform such processing, the navigation controller 10 is equipped with the locus information creation section 20, the locus information transmitting section 22, and the transmit timing judging section 24.
[0017] Whenever predetermined time t passes whenever it acquires the date and time of day which are measured by the detection result and clock 18 by the autonomous navigation sensor 14 and a car runs the predetermined distance k or, the locus information creation section 20 creates the locus information (transit locus information) which shows the transit locus of a car, and stores it in memory 17. The locus information mentioned above includes the time (a date and time of day) in which a car location (lat/long) and this car location were detected. Since the locus information creation section 20 of this operation gestalt is creating locus information using the detection result of the autonomous navigation sensor 14, also when a car is in a tunnel and a basement car park and GPS cannot be used, it can acquire a car location certainly and can create locus information.
[0018] The locus information transmitting section 22 reads the locus information which was created by the locus information creation section 20 and was stored in memory 17, uses such locus information as a mass of data, adds the car ID for identifying the car with which navigation equipment 1-1 is carried, and performs processing transmitted to the map information server 2. The transmit timing judging section 24 judges transmit timing at the time of transmitting the locus information created by the locus information creation section 20 by the locus information transmitting section 22.
[0019] It is loaded with DVD of one sheet or two or more sheets, and the DVD reader 11 reads map information from one of DVDs by control of the navigation controller 10. The control unit 12 is equipped with various kinds of actuation keys, such as an vertical and horizontal cursor key, an vertical and horizontal ten key, etc., and outputs the signal according to the content of actuation to the navigation controller 10.
[0020] GPS receiver 13 receives the electric wave sent from two or more GPS Satellites, performs three-dimension positioning processing or two-dimensional positioning processing, calculates the absolute location and bearing of a car, and outputs these with positioning time of day. The autonomous navigation sensor 14 is equipped with angle sensors, such as an oscillating gyroscope which detects angle of rotation of a car as relative bearing, and the distance robot which outputs one pulse whenever it runs predetermined distance, and detects the relative position and bearing of a car.
[0021] An indicating equipment 15 displays various images, such as a map image around a car location, based on the video signal outputted from the navigation controller 10. The communications processing section 16 performs required processing, in order that the navigation controller 10 may perform data communication between the map information servers 2 through a network 3. The mobile radiotelephone (not shown) is connected to this communications processing section 16. Memory 17 stores the locus information created by the locus information creation section 20 in the navigation controller 10. The clock 18 is measuring a date and time of day (transit time), and outputs a current date and time of day according to the demand from the navigation controller 10.
[0022] Next, the detail configuration of the map information server 2 is explained. Drawing 3 is drawing showing the detail configuration of the map information server 2. The map information server 2 shown in

drawing 3 is constituted including the server control section 50, the map information DB(database) 52, the locus information DB54, and the communications processing section 56.
[0023] The server control section 50 controls actuation by the whole map information server 2, in order to update map information using the locus information sent from navigation equipment 1-1 grade, and it is equipped with the locus information receive section 68, the route configuration decision section 70, the renewal section 72 of a map configuration, the renewal section 74 of transit cost, the traffic stop judging section 76, and the updating timing judging section 78. This server control section 50 has the configuration as a computer containing CPU, ROM, RAM, etc., and performs predetermined control action by performing predetermined software (program) stored in ROM or RAM.
[0024] The locus information receive section 68 performs processing which receives the navigation equipment 1-1 carried in each car, 1-2, --, the locus information transmitted from each of 1-n. The route configuration decision section 70 asks for the transit locus for every car based on the locus information transmitted from each navigation equipment, and determines a route configuration using these transit loci. The renewal section 72 of a map configuration compares the map information stored in the route configuration determined by the route configuration decision section 70 and the map information DB52, and performs processing which updates the data about the route configuration included in map information.
[0025] The renewal section 74 of transit cost performs processing which updates the data about the transit cost (travel time) of each route used for path planning etc. among the map information stored in the map information DB52 based on the locus information stored in the locus information DB54. The traffic stop judging section 76 performs processing which creates the predetermined traffic stop information that those routes are specified, and is stored in the map information DB52, when it judges whether the high route of possibility of being closed exists based on the locus information stored in the locus information DB54 and the route of traffic stop exists. For example, although the transit frequency of an adjoining route is high to some extent, when the route a car does not run at all exists, this route is judged as a route of traffic stop. Although a route exists, the case where the route itself [else / in the case of being closed] is abolished is included by the route of this traffic stop. Moreover, since it cannot judge to accuracy whether it is the route of traffic stop when there are few measurement sizes, this judgment is omitted when a measurement size is below a predetermined value. The updating timing judging section 78 judges the updating timing of the map information stored in the map information DB52.
[0026] The map information DB52 stores map information required for navigation actuation of a map display, path planning, a course guidance, etc. The locus information DB54 stores the locus information transmitted from navigation equipment 1-1 grade. The communications processing section 56 performs processing required in order that the server control section 50 may perform data communication between navigation equipment 1-1 grades through a network 3.
[0027] The locus information receive section 68 which mentioned above corresponds to a locus information receiving means, and the route configuration decision section 70, the renewal section 72 of a map configuration, the renewal section 74 of transit cost, and the traffic stop judging section 76 correspond to the renewal means of map information, respectively. Moreover, the locus information transmitting section 22 corresponds to a locus information transmitting means, and the transmit timing judging section 24 corresponds [the locus information creation section 20] to a locus information creation means at a transmit timing judging means, respectively.
[0028] The renewal system of map information of this operation gestalt has such a configuration, and explains the actuation below.
(1) Drawing 4 of navigation equipment of operation is the flow chart showing the operations sequence of the navigation equipment 1-1 at the time of creating locus information and transmitting. In addition, same processing is performed also in other navigation equipment 1-2 grades.
[0029] The locus information creation section 20 judges whether predetermined time t (for example, for several seconds) passed (step 100). When predetermined time t has not passed, negative judgment is made at step 100 and the locus information creation section 20 judges whether the car moved the predetermined distance k (for example, several m) (step 101). When the car is not moving the predetermined distance k, negative

judgment is made at step 101 and the locus information creation section 20 repeats the processing after returning to step 100 mentioned above.
[0030] When predetermined time t passes (it is affirmative judgment at step 100), or when the predetermined distance k is moved (it is affirmative judgment at step 101), the locus information creation section 20 acquires a current car location from the autonomous navigation sensor 14 while acquiring current time (a date and time of day) from a clock 18 (step 102) (step 103). Next, the locus information creation section 20 creates locus information using current time and a current car location, and stores it in memory 17 (step 104).
[0031] It judges whether the transmit timing judging section 24 became the transmit timing of locus information (step 105). Specifically, the transmit timing judging section 24 judges with it being the transmit timing of locus information (for example, when acquiring map information from the map information server 2 etc.), when the amount of data of the locus information accumulated in the (1) memory 17 exceeded the specified quantity, or when (2) navigation equipment 1-1 needs to perform data communication between the map information servers 2. When it is not transmit timing, negative judgment is performed at step 105 and the processing after returning to step 100 mentioned above is repeated.
[0032] Processing which affirmative judgment is made at step 105 when it becomes the transmit timing of locus information, next the locus information transmitting section 22 reads the locus information accumulated in memory 17, adds Car ID, and is transmitted to the map information server 2 is performed (step 106). Then, it returns to step 100 mentioned above, and processing after it is repeated.
[0033] (2) Drawing 5 of the map information server 2 of operation is the flow chart showing the operations sequence of the map information server 2 at the time of updating map information based on the locus information transmitted from each navigation equipment. The locus information receive section 68 judges whether locus information was transmitted from the navigation equipment 1-1 grade (step 200). When locus information is not transmitted, negative judgment is made, and judgment processing of step 200 is repeated. Moreover, when locus information is transmitted, affirmative judgment is made at step 200, and the locus information receive section 68 stores the transmitted locus information in the locus information DB54 (step 201).
[0034] Moreover, it judges whether the updating timing judging section 78 became the updating timing of map information (step 202). Specifically, the updating timing judging section 78 judges that it is the updating timing of map information, when the amount of data of the locus information accumulated in the locus information DB54 exceeds the specified quantity (for example, amount of data corresponding to hundreds of cars). When it is not the updating timing of map information, negative judgment is made at step 202 and the processing after returning to step 200 mentioned above is repeated.
[0035] When it becomes the updating timing of map information, affirmative judgment is made at step 202, next the route configuration decision section 70 asks for the transit locus of each car using the locus information stored in the locus information DB54, and a route configuration is determined based on these transit loci (step 203).
[0036] Drawing 6 is drawing showing the content of the processing which determines a route configuration. As shown in drawing 6 , the route configuration decision section 70 asks for the transit locus 200-1,200-2, --, 200-n based on navigation equipment 1-1, 1-2, --, the locus information transmitted from each of 1-n. The route configuration decision section 70 compounds these transit loci 200-1,200-2, --, 200-n. Next, the transit locus 210 after composition, While performing range correction and angle correction to the transit locus 210 after composition based on the data about the route configuration included in the map information stored in the map information DB52 Pattern matching etc. is processed using the transit locus 210 after this amendment, and the final route configuration 220 is determined.
[0037] Next, the renewal section 72 of a map configuration performs processing which updates the data about the route configuration included in the map information stored in the map information DB52 using the route configuration determined by the route configuration decision section 70 (step 204). About the detail of the content of processing in step 204, it mentions later.
[0038] Moreover, the renewal section 74 of transit cost performs processing which updates the data about the transit cost of each route included in the map information stored in the map information DB52 using the locus

information stored in the locus information DB54 (step 205). Since the transit duration of a route is specifically computable by using locus information, transit cost can be updated by asking for the transit cost about each route based on this transit duration. Especially, with this operation gestalt, since the time by which the positional information was created with the positional information for specifying a route is included in locus information, time elements, such as a day of the week, a time zone, and a season, can be considered, and it can ask for the actual transit cost about each route.

[0039] Moreover, the traffic stop judging section 76 judges whether the closed route exists using the route configuration determined by the route configuration decision section 70 (step 206). When the route of traffic stop does not exist, negative judgment is made at step 206 and return and future processings are repeated by step 200 mentioned above.

[0040] Moreover, when the route of traffic stop exists, affirmative judgment is made at step 206, and the traffic stop judging section 76 performs processing which creates the predetermined traffic stop information that the route of traffic stop is specified, and is stored in the map information DB52 (step 207). Then, it returns to step 200 mentioned above, and processing after it is repeated.

[0041] Drawing 7 is drawing showing roughly the content of the processing which judges an update process of a route configuration, and the route of traffic stop. In drawing 7 , the route configuration specified based on the map information stored in the map information DB52 is shown by the dotted line, and the route configuration determined by the route configuration decision section 70 is shown by the continuous line.

[0042] The renewal section 72 of a map configuration compares the route configuration (dotted line) specified based on map information with the route configuration (continuous line) determined by the route configuration decision section 70, detects both difference, and updates the content of the data about the route configuration included in map information. Moreover, although the route is to exist in map information, when the route where the route configuration is not determined, i.e., the route through which the car is not passing at all, exists like the route 300 shown in drawing 7 R> 7, the traffic stop judging section 70 judges those routes that possibility of being closed is a high route, and creates traffic stop information.

[0043] Thus, in the renewal system of map information of this operation gestalt, since the content of the map information DB52 in the map information server 2 can be serially updated based on the transit locus information sent from the navigation equipment actually carried in the car under transit, the precision of map information can be raised.

[0044] Moreover, by the former, creation of the map information on the high degree of accuracy in which the actual transit cost which has not been grasped to accuracy was made to reflect is attained by including the data of transit cost in the map information stored in the map information DB52 in addition to a route configuration, and updating based on the transit hysteresis information that this is sent from each car. Therefore, it becomes possible by performing path planning processing using this transit cost data to perform retrieval of the high optimal transit path of precision, and count of exact arrival anticipation time of day. Furthermore, since the existence of the closed route or the abolished route can be judged now on real time, it becomes possible to make the newest route configuration always reflect in map information, and to raise the precision of map information.

[0045] Moreover, when the navigation controller 10 of the navigation equipment carried in the car is equipped with the locus information creation section 20, the locus information transmitting section 22, and the transmit timing judging section 24, it becomes possible to send transit locus information to the map information server 2 from the car under transit to predetermined timing, and it can update the content of the map information DB52 serially based on the transit locus information actually sent from the car under transit. Moreover, compared with the case where detection results, such as a GPS receiver, are used, little transit locus information on with error can be acquired by creating transit hysteresis information using the detection result of an autonomous navigation sensor.

[0046] In addition, this invention is not limited to the above-mentioned operation gestalt, and various deformation implementation is possible for it within the limits of the summary of this invention. For example, although it had judged that it was the route of traffic stop with the operation gestalt mentioned above about the route through which collates with map information the route configuration determined by the route configuration

decision section 70, and the car is not passing at all, it can also judge about generating of a new route reversely. In this case, what is necessary is to judge it that possibility that the new route is established is high when it judges and the route configuration is determined whether the route configuration is determined as the location where a route should not exist according to map information, to add a new route or just to take up as objects, such as a field survey.

[0047] Moreover, although the locus information creation section 20 contained in navigation equipment 1-1 grade was creating locus information based on the output of the autonomous navigation sensor 14, you may make it create locus information with the operation gestalt mentioned above based on the output of GPS receiver 13. Also in the navigation equipments (for example, navigation equipment of a portable mold etc.) equipped only with the GPS receiver as a means to detect the current position of a self-vehicle, by this, this invention is applicable. Moreover, when updating the route of traffic stop, and abolition or a new route or performing renewal of transit cost etc., the locus information after map matching processing was carried out inside the navigation equipment 1-1 grade may be used.

[0048] Moreover, although the content of the map information DB52 in the map information server 2 was updated with the operation gestalt mentioned above based on the locus information sent from the navigation equipment 1-1 grade, the error of each sent locus information is judged and you may make it transmit the error information according to individual towards each car from the map information server 2. Thereby, by each car, it can become possible to get to know the error of the car location and bearing detected using the autonomous navigation sensor 14, this error can be amended, and exact car location and bearing can be known. It enables this to realize navigation actuation with a high precision only using the autonomous navigation sensor 14, without combining with GPS receiver 13.

[0049]

[Effect of the Invention] Since the content of the map information database can be serially updated based on the transit locus information actually sent from the car under transit according to this invention as mentioned above, the precision of map information can be raised.

[Translation done.]